§ 652.13

and the metropolitan planning organization.

§652.13 Design and construction cri-

- (a) The American Association of State Highway and Transportation Officials' "Guide for Development of New Bicycle Facilities, 1981" (AASHTO Guide) or equivalent guides developed in cooperation with State or local officials and acceptable to the division office of the FHWA, shall be used as standards for the construction and design of bicycle routes. Copies of the AASHTO Guide may be obtained from the American Association of State Highway and Transportation Officials, 444 North Capitol Street, NW., Suite 225. Washington, DC 20001.
- (b) Curb cuts and other provisions as may be appropriate for the handicapped are required on all Federal and Federal-aid projects involving the provision of curbs or sidewalks at all pedestrian crosswalks.

PART 655—TRAFFIC OPERATIONS

Subparts A-E [Reserved]

Subpart F-Traffic Control Devices on Federal-Aid and Other Streets and Highways

Sec.

655.601 Purpose.

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APPENDIX TO SUBPART F OF PART 655-ALTER-NATE METHOD OF DETERMINING THE COLOR OF RETROREFLECTIVE SIGN MATERIALS AND PAVEMENT MARKING MATERIALS

Subpart G [Reserved]

AUTHORITY: 23 U.S.C. 101(a), 104, 109(d), 114(a), 217, 315, and 402(a); 23 CFR 1.32; and 49 CFR 1.48(b).

Subparts A-E [Reserved]

Subpart F—Traffic Control Devices on Federal-Aid and Other Streets and Highways

SOURCE: 48 FR 46776, Oct. 14, 1983, unless otherwise noted.

§655.601 Purpose.

To prescribe the policies and procedures of the Federal Highway Administration (FHWA) to obtain basic uniformity of traffic control devices on all streets and highways in accordance with the following references that are approved by the FHWA for application on Federal-aid projects:

(a) Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), 2009 Edition, FHWA, dated November 4, 2009. This publication is incorporated by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 and is on file at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA call 741–6030, or go to *http://* www.archives.gov/Federal register/

code of Federal regulations/ ibr locations.html. It is available for inspection and copying at the Federal Highway Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590, telephone 202-366-1993, as provided in 49 CFR part 7. The text is also available from the FHWA Office of Operations Web site at: http://mutcd.fhwa.dot.gov.

(b) Guide to Metric Conversion, AASHTO, 1993. This publication is incorporated by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 and is on file at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/ federal_register/

code_of_federal_regulations/
ibr_locations.html. This document is available for inspection as provided in 49 CFR part 7. It may be purchased from the American Association of State Highway and Transportation Officials, Suite 249, 444 North Capitol Street, NW., Washington, DC 20001.

(c) Traffic Engineering Metric Conversion Factors, 1993—Addendum to the Guide to Metric Conversion, AASHTO, October 1993. This publication is incorporated by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 and is on file at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code of_federal_regulations/

ibr_locations.html. This document is available for inspection as provided in 49 CFR part 7. It may be purchased from the American Association of State Highway and Transportation Officials, Suite 249, 444 North Capitol Street, NW., Washington, DC 20001.

[51 FR 16834, May 7, 1986, as amended at 60 FR 18521, Apr. 11, 1995; 61 FR 29626, June 11, 1996; 62 FR 1373, Jan. 9, 1997; 63 FR 8351, Feb. 19, 1998; 63 FR 33549, June 19, 1998; 64 FR 33753, June 24, 1999; 65 FR 13, Jan. 3, 2000; 67 FR 78958, Dec. 18, 2000; 69 FR 18803, Apr. 9, 2004; 71 FR 75115, Dec. 14, 2006; 72 FR 72582, Dec. 21, 2007; 74 FR 66861, Dec. 16, 2009]

$\S 655.602$ Definitions.

The terms used herein are defined in accordance with definitions and usages contained in the MUTCD and 23 U.S.C. 101(a).

§ 655.603 Standards.

(a) National MUTCD. The MUTCD approved by the Federal Highway Administrator is the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel in accordance with 23 U.S.C. 109(d) and 402(a). For the purpose of MUTCD applicability, open to public travel includes toll roads and roads within shopping centers, airports, sports arenas, and other similar business and/or recreation facilities that are privately owned but where the public is allowed to travel without access restrictions. Except for gated toll roads, roads within private gated properties where access is restricted at all times are not included in this definition. Parking areas, driving aisles within parking areas, and private highway-rail grade crossings are also not included in this definition.

(b) State or other Federal MUTCD. (1) Where State or other Federal agency MUTCDs or supplements are required, they shall be in substantial conform-

ance with the National MUTCD. Substantial conformance means that the State MUTCD or supplement shall conform as a minimum to the standard statements included in the National MUTCD. The FHWA Division Administrators and Associate Administrator for the Federal Lands Highway Program may grant exceptions in cases where a State MUTCD or supplement cannot conform to standard statements in the National MUTCD because of the requirements of a specific State law that was in effect prior to the effective date of this final rule, provided that the Division Administrator or Associate Administrator determines based on information available and documentation received from the State that the non-conformance does not create a safety concern. The guidance statements contained in the National MUTCD shall also be in the State Manual or supplement unless the reason for not including it is satisfactorily explained based on engineering judgment, specific conflicting State law, or a documented engineering study. The FHWA Division Administrators shall approve the State MUTCDs and supplements that are in substantial conformance with the National MUTCD. The FHWA AssociateAdministrator of the Federal Lands Highway Program shall approve other Federal land management agencies MUTCDs and supplements that are in substantial conformance with the National MUTCD. The FHWA Division Administrators and the FHWA Associate Administrators for the Federal Lands Highway Program have the flexibility to determine on a case-bycase basis the degree of variation allowed.

- (2) States and other Federal agencies are encouraged to adopt the National MUTCD in its entirety as their official Manual on Uniform Traffic Control Devices.
- (3) States and other Federal agencies shall adopt changes issued by the FHWA to the National MUTCD within two years from the effective date of the final rule. For those States that automatically adopt the MUTCD immediately upon the effective date of the latest edition or revision of the MUTCD, the FHWA Division Administrators have the flexibility to allow

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these States to install certain devices from existing inventory or previously approved construction plans that comply with the previous MUTCD during the two-year adoption period.

- (c) Color specifications. Color determinations and specifications of sign and pavement marking materials shall conform to requirements of the FHWA Color Tolerance Charts. An alternate method of determining the color of retroreflective sign material is provided in the appendix.
- (d) Compliance—(1) Existing highways. Each State, in cooperation with its political subdivisions, and Federal agency shall have a program as required by 23 U.S.C. 402(a), which shall include provisions for the systematic upgrading of substandard traffic control devices and for the installation of needed devices to achieve conformity with the MUTCD. The FHWA may establish target dates of achieving compliance with changes to specific devices in the MUTCD.
- (2) New or reconstructed highways. Federal-aid projects for the construction, reconstruction, resurfacing, restoration, or rehabilitation of streets and highways shall not be opened to the public for unrestricted use until all appropriate traffic control devices, either temporary or permanent, are installed and functioning properly. Both temporary and permanent devices shall conform to the MUTCD.
- (3) Construction area activities. All traffic control devices installed in construction areas using Federal-aid funds shall conform to the MUTCD. Traffic control plans for handling traffic and pedestrians in construction zones and for protection of workers shall conform to the requirements of 23 CFR part 630, subpart J, Traffic Safety in Highway and Street Work Zones.

[48 FR 46776, Oct. 14, 1983, as amended at 51 FR 16834, May 7, 1986; 68 FR 14139, Mar. 24, 2003; 71 FR 75115, Dec. 14, 2006; 74 FR 28442, June 16, 2009; 74 FR 66861, Dec. 16, 2009]

§655.604 Achieving basic uniformity.

- (a) Programs. Programs for the orderly and systematic upgrading of existing traffic control devices or the installation of needed traffic control devices on or off the Federal-aid system should be based on inventories made in accordance with the Highway Safety Program Guideline 21, "Roadway Safety." These inventories provide the information necessary for programming traffic control device upgrading projects.
- (b) Inventory. An inventory of all traffic control devices is recommended in the Highway Safety Program Guideline 21, "Roadway Safety." Highway planning and research funds and highway related safety grant program funds may be used in statewide or systemwide studies or inventories. Also, metropolitan planning (PL) funds may be used in urbanized areas provided the activity is included in an approved unified work program.

[48 FR 46776, Oct. 14, 1983, as amended at 71 FR 75115, Dec. 14, 2006]

$\S 655.605$ Project procedures.

- (a) Federal-aid highways. Federal-aid projects involving the installation of traffic control devices shall follow procedures as established in 23 CFR part 630, subpart A, Federal-Aid Programs Approval and Project Authorization. Simplified and timesaving procedures are to be used to the extent permitted by existing policy.
- (b) Off-system highways. Certain federally funded programs are available for installation of traffic control devices on streets and highways that are not on the Federal-aid system. The procedures used in these programs may vary from project to project but, essentially, the guidelines set forth herein should be used.

§655.606 Higher cost materials.

The use of signing, pavement marking, and signal materials (or equipment) having distinctive performance characteristics, but costing more than other materials (or equipment) commonly used may be approved by the FHWA Division Administrator when the specific use proposed is considered to be in the public interest.

¹Available for inspection from the Office of Traffic Operations, Federal Highway Administration, 1200 New Jersey Avenue, SE., Washington, DC.

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§655.607 Funding.

- (a) Federal-aid highways. (1) Funds apportioned or allocated under 23 U.S.C. 104(b) are eligible to participate in projects to install traffic control devices in accordance with the MUTCD on newly constructed, reconstructed, resurfaced, restored, or rehabilitated highways, or on existing highways when this work is classified as construction in accordance with 23 U.S.C. 101(a). Federal-aid highway funds for eligible pavement markings and traffic control signalization may amount to 100 percent of the construction cost. Federal-aid highway funds apportioned or allocated under other sections of 23 U.S.C. are eligible for participation in improvements conforming to the MUTCD in accordance with the provisions of applicable program regulations
- (2) Traffic control devices are eligible, in keeping with paragraph (a)(1) of this section, provided that the work is classified as construction in accordance with 23 U.S.C. 101(a) and the State or local agency has a policy acceptable to the FHWA Division Administrator for selecting traffic control devices material or equipment based on items such as cost, traffic volumes, safety, and expected service life. The State's policy should provide for cost-effective selection of materials which will provide for substantial service life taking into account expected and necessary routine maintenance. For these purposes, effectiveness would normally be measured in terms of durability, service life and/or performance of the material. Specific projects including material or equipment selection shall be developed in accordance with this policy. Proposed work may be approved on a project-by-project basis when the work is (i) clearly warranted, (ii) on a Federal-aid system, (iii) clearly identified by site, (iv) substantial in nature, and (v) of sufficient magnitude at any given location to warrant Federal-aid participation as a construction item.
- (3) The method of accomplishing the work will be in accordance with 23 CFR part 635, subpart A, Contract Procedures.
- (b) Off-system highways. Certain Federal-aid highway funds are eligible to participate in traffic control device im-

provement projects on off-system highways. In addition, Federal-aid highway funds apportioned or allocated in 23 U.S.C. are eligible for the installation of traffic control devices on any public road not on the Federal-aid system when the installation is directly related to a traffic improvement project on a Federal-aid system route.

- APPENDIX TO SUBPART F OF PART 655—
 ALTERNATE METHOD OF DETERMINING THE COLOR OF
 RETROREFLECTIVE SIGN MATERIALS
 AND PAVEMENT MARKING MATERIALS
- 1. Although the FHWA Color Tolerance Charts depreciate the use of spectrophotometers or accurate tristimulus colorimeters for measuring the daytime color of retroreflective materials, recent testing has determined that 0/45 or 45/0 spectroradiometers and tristimulus colorimeters have proved that the measurements can be considered reliable and may be used.
- 2. The daytime color of non-fluorescent retroreflective materials may be measured in accordance with ASTM Test Method E1349, "Standard Test Method for Reflec-Factor Color and Spectrophotometry Using Bidirectional Geometry" or ASTM Test Method E 1347 (Replaces E97), "Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry." The latter test method specified bidirectional geometry for the measurement of retroreflective materials. The geometric conditions to be used in both test methods are 0/45 or 45/0 circumferential illumination or viewing. Uniplanar geometry is not recommended for material types IV or higher (designated microprismatic). The CIE standard illuminant used in computing the colorimetric coordinates shall be D65 and the 2 Degree Standard CIE observer shall be used.
- 3. For fluorescent retroreflective materials ASTM E991 may be used to determine the chromaticity provided that the D_{65} illumination meets the requirements of E 991. This practice, however, allows only the total luminous factor to be measured. The fluorescent luminous factor must be determined using bispectral fluorescent colorimetry. Commercial instruments are available which allow such determination. Some testing laboratories are also equipped to perform these measurements.
- 4. For nighttime measurements CIE Standard Illuminant A shall be used in computing the colorimetric coordinates and the 2 Degree Standard CIE Observer shall be used.

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- 5. Average performance sheeting is identified as Types I and II sheeting and high performance sheeting is identified as Type III. Super-high intensity sheeting is identified as Types V, VI, and VII in ASTM D 4956.
- 6. The following nine tables depict the 1931 CIE Chromaticity Diagram x and y coordinates for the corner points defining the recommended color boxes in the diagram and

the daytime luminance factors for those colors. Lines drawn between these corner points specify the limits of the chromaticity allowed in the 1931 Chromaticity Diagram. Color coordinates of samples that lie within these lines are acceptable. For blue and green colors the spectrum locus is the defining limit between the corner points located on the spectrum locus:

Table 1 to Appendix to Part 655, Subpart F—Daytime Color Specification Limits for Retroreflective Material With CIE 2° Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D₆₅.

	Chromaticity Coordinates									
Color	1		2		:	3	4			
	х	у	х	у	у	x	x	у		
White	0.303	0.300	0.368	0.366	0.340	0.393	0.274	0.329		
Red	0.648	0.351	0.735	0.265	0.629	0.281	0.565	0.346		
Orange	0.558	0.352	0.636	0.364	0.570	0.429	0.506	0.404		
Brown	0.430	0.340	0.430	0.390	0.518	0.434	0.570	0.382		
Yellow	0.498	0.412	0.557	0.442	0.479	0.520	0.438	0.472		
Green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	0.771		
Blue	0.078	0.171	0.150	0.220	0.210	0.160	0.137	0.038		
Light Blue	0.180	0.260	0.240	0.300	0.270	0.260	0.230	0.200		
Purple	0.302	0.064	0.310	0.210	0.380	0.255	0.468	0.140		

Table 1a to Appendix to Part 655, Subpart F—Daytime Luminance Factors (%) for Retroreflective Material With CIE 2° Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D₆₅.

	Daytime Luminance Factor (Y %) by ASTM Type									
Color	Color Types I, II, III and VI		nd VI Types IV, VII, and VIII			e V				
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum				
White	27		40		15					
Red	2.5	12	3.0	15	2.5	11				
Orange	14	30	12	30	7.0	25				
Brown	4.0	9.0	1.0	6.0	1.0	9.0				
Yellow	15	45	24	45	12	30				
Green	3.0	9.0	3.0	12	2.5	11				
Blue	1.0	10	1.0	10	1.0	10				
Light Blue	12	40	18	40	8.0	25				
Purple	2.0	10	2.0	10	2.0	10				

Table 2 to Appendix to Part 655, Subpart F—Nighttime Color Specification Limits for Retroreflective Material With CIE 2° Standard Observer and Observation Angle of 0.33°, Entrance Angle of +5° and CIE Standard Illuminant A.

	Chromaticity Coordinates								
Color	1		2		3		4		
	x	У	x	У	х	У	х	У	
White	0.475	0.452	0.360	0.415	0.392	0.370	0.515	0.409	
Red	0.650	0.348	0.620	0.348	0.712	0.2550	0.735	0.265	
Orange	0.595	0.405	0.565	0.405	0.613	0.355	0.643	0.355	
Brown	0.595	0.405	0.540	0.405	0.570	0.365	0.643	0.355	
Yellow	0.513	0.487	0.500	0.4700	0.545	0.425	0.572	0.425	
Green	0.007	0.570	0.200	0.500	0.322	0.590	0.193	0.782	
Blue	0.033	0.370	0.180	0.370	0.230	0.240	0.091	0.133	
Purple	0.355	0.088	0.385	0.288	0.500	0.350	0.635	0.221	

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Table 2 to Appendix to Part 655, Subpart F—Nighttime Color Specification Limits for Retroreflective Material With CIE 2° Standard Observer and Observation Angle of 0.33°, Entrance Angle of +5° and CIE Standard Illuminant A.—Continued

Color		Chromaticity Coordinates							
	1		2		3		4		
	x	у	x	У	x	у	x	у	
Light Blue		Chromaticity coordinates are yet to be determined.							

NOTE: Materials used as High-Conspicuity, Retroreflective Traffic Signage Materials shall meet the requirements for Daytime Color Specification Limits, Daytime Luminance Factors and Nighttime Color Specification Limits for Fluorescent Retroreflective Material, as described in Tables 3, 3a, and 4, throughout the service life of the sign.

Table 3 to Appendix to Part 655, Subpart F—Daytime Color Specification Limits for Fluorescent Retroreflective Material with CIE 2° Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D₆₅.

	Chromaticity Coordinates								
Color	1		2		3		4		
	x	у	x	у	х	у	х	у	
Fluorescent Orange	0.583	0.416	0.535	0.400	0.595	0.351	0.645	0.355	
Fluorescent Yellow	0.479	0.520	0.446	0.483	0.512	0.421	0.557	0.442	
Fluorescent Yellow-Green	0.387	0.610	0.369	.546	.428	.496	0.460	0.540	
Fluorescent Green	0.210	0.770	0.232	0.656	0.320	0.590	0.320	0.675	
Fluorescent Pink	0.450	0.270	0.590	0.350	0.644	0.290	0.536	0.230	
Fluorescent Red	0.666	0.334	0.613	0.333	0.671	0.275	9.735	0.265	

Table 3a to Appendix to Part 655, Subpart F—Daytime Luminance Factors (%) for Fluorescent Retroreflective Material With CIE 2° Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D₆₅.

Color	Luminance Factor Limits (Y)				
Color	Min	Max	Y _F *		
Fluorescent Orange	25	None	15		
Fluorescent Yellow	45	None	20		
Fluorescent Yellow-Green	60	None	20		
Fluorescent Green	20	30	12		
Fluorescent Pink	25	None	15		
Fluorescent Red	20	30	15		

^{*}Fluorescence luminance factors (YF) are typical values, and are provided for quality assurance purposes only. YF shall not be used as a measure of performance during service.

Table 4 to Appendix to Part 655, Subpart F—Nighttime Color Specification Limits for Fluorescent Retroreflective Material With CIE 2° Standard Observer and Observation Angle of 0.33°, Entrance Angle of +5° and CIE Standard Illuminant A.

	Chromaticity Coordinates								
Color	1		2		3		4		
	х	у	x	у	х	у	x	у	
Fluorescent Orange	0.625	0.375	0.589	0.376	0.636	0.330	0.669	0.331	
Fluorescent Yellow Fluorescent Yellow-Green	0.554 0.480	0.445 0.520	0.526 0.473	0.437 0.490	0.569 0.523	0.394 0.440	0.610 0.550	0.390 0.449	
Fluorescent Green	0.007 0.680	0.570 0.320	0.200 0.645	0.500 0.320	0.322 0.712	0.590 0.253	0.193 0.735	0.782 0.265	

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TABLE 5 TO APPENDIX TO PART 655, SUBPART F-DAYTIME COLOR SPECIFICATION LIMITS FOR RETROREFLECTIVE PAVEMENT MARKING MATERIAL WITH CIE 2° STANDARD OBSERVER AND 45/0 (0/45) GEOMETRY AND CIE STANDARD ILLUMINANT D₆₅.

	Chromaticity Coordinates								
Color	1		2		3		4		
	x	у	х	у	x	у	х	у	
White Yellow Red Blue Purple	0.355 0.560 0.480 0.105 0.300	0.355 0.440 0.300 0.100 0.064	0.305 0.490 0.690 0.220 0.309	0.305 0.510 0.315 0.180 0.260	0.285 0.420 0.620 0.200 0.362	0.325 0.440 0.380 0.260 0.295	0.335 0.460 0.480 0.060 0.475	0.375 0.400 0.360 0.220 0.144	

TABLE 5A TO PART 655, SUBPART F-DAYTIME LUMINANCE FACTORS (%) FOR RETROREFLECTIVE PAVEMENT MARKING MATERIAL WITH CIE 2° STANDARD OBSERVER AND 45/0 (0/45) GEOMETRY AND CIE STANDARD ILLUMINANT D65.

Color	Luminance Factor (Y%)			
Coloi	Minimum	Maximum		
White Yellow Red	35 25 6	15		
Blue	5	14 15		

TABLE 6 TO APPENDIX TO PART 655. SUBPART F-NIGHTIME COLOR SPECIFICATION LIMITS FOR RETROREFLECTIVE PAVEMENT MARKING MATERIAL WITH CIE 2° STANDARD OBSERVER, OBSERVA-TION ANGLE OF 1.05°, ENTRANCE ANGLE OF +88.76° AND CIE STANDARD ILLUMINANT A.

	Chromaticity Coordinates								
Color	1		2		3		4		
	x	у	x	у	x	у	x	у	
White Yellow Purple	0.480 0.575 0.338	0.410 0.425 0.080	0.430 0.508 0.425	0.380 0.415 0.365	0.405 0.473 0.470	0.405 0.453 0.385	0.455 0.510 0.635	0.435 0.490 0.221	

NOTE: Luminance factors for retroreflective pavement marking materials are for materials as they are intended to be used. For paint products, that means inclusion of glass beads and/or other retroreflective components.

[67 FR 49572, July 31, 2002, as amended at 67 FR 70163, Nov. 21, 2002; 68 FR 65582, 65583, Nov. 20, 2003; 74 FR 66862, 66863, Dec. 16, 2009]

EDITORIAL NOTE: At 74 FR 66862, Dec. 16, 2009, the appendix to subpart F was amended in Table 3 by revising the daytime chromaticity coordinates for the color Fluorescent Pink; however, the amendment could not be incorporated due to inaccurate amendatory instruction.

Subpart G [Reserved]

VANPOOL PROJECTS

Sec.

656.1 Purpose. 656.3 Policy. 656.5 Eligibility.

PART 656—CARPOOL AND

656.7 Determination of an exception.

AUTHORITY: 23 U.S.C. 146 and 315; sec. 126 of the Surface Transportation Assistance Act of 1978, Pub. L. 95-599, 92 Stat. 2689; 49 CFR 1.48(b).

Source: 47 FR 43024, Sept. 30, 1982, unless otherwise noted.

§656.1 Purpose.

The purpose of this regulation is to prescribe policies and general procedures for administering a program of ridesharing projects using Federal-aid primary, secondary, and urban system funds.